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CLAIMS

[c1] An autostereoscopic image displaying method capable of reproducing all four physiological depth perception cues as defined in the specification by means of using an autostereoscopic display apparatus for displaying a subject in still or motion picture, said display comprising:

an array of light projecting devices wherein each light projecting device emanates light with a predetermined directional distribution in intensity and color and the whole array reproduces light distribution from a three-dimensional scene, said light projecting devices facing the viewer and are placed sufficiently close to each other so that the viewer would not notice granularity when viewing the image from a distance larger than a certain minimum distance.

[c2] An autostereoscopic display method and apparatus according to claim 1, wherein said array of light projecting devices comprising:

a lens array comprising a plurality of elemental lenses, wherein the light that originates from focal points of individual lenses forms an autostereoscopic image;

an image projector or a collection of such for projecting light in a form of a non-diffuse light, said projector(s) placed behind the lens array as viewed from the viewer's position and projecting light onto the lens array and wherein said projector(s) is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the

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lens array, said projector(s) displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus.

[c3] An autostereoscopic display method and apparatus according to claim 1, wherein said array of light projecting devices comprising:

an aperture screen made of opaque material with plurality of apertures, wherein said apertures are transparent and do not significantly diffuse light, in said aperture screen light that originates in individual apertures and that is emitted from apertures at a range of directions forms an autostereoscopic image;

a lens array composed of plurality of elemental converging lenses placed behind the aperture screen as viewed from the viewer's position, wherein points where the light is focused by individual lenses coincide with apertures of the aperture screen;

an image projector or a collection of such for projecting light preferably but not necessarily in a form of a non-diffuse light, said projector(s) placed behind the lens array as viewed from the viewer's position and projecting light onto the lens array, wherein said projector(s) in the case of non-diffuse light is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array, said projector(s) displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus.

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[c4] An autostereoscopic display method and apparatus according to claim 2, wherein said image projector or a collection of such comprising:

- a spatial light modulator placed behind the lens array as viewed from the viewer's position,
- said spatial light modulator made out of material that does not diffuse light significantly,
- wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;
- a backlight in a form of a non-diffuse light source placed behind the spatial light modulator as viewed from the viewer's position, said backlight projecting light onto the spatial light modulator, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the spatial light modulator.

[c5] An autostereoscopic display method and apparatus according to claim 3, wherein said image projector or a collection of such comprising:

- a spatial light modulator placed behind the lens array as viewed from the viewer's position,
- said spatial light modulator made out of material that does not diffuse light significantly,
- wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;
- a backlight preferably but not necessarily in a form of a non-diffuse light source placed behind the spatial light modulator as viewed from the viewer's position, said backlight projecting light onto the spatial light modulator, wherein said backlight is emanating light rays that

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have a predetermined direction, intensity and color at every point where they hit the spatial light modulator.

[c6] An autostereoscopic display method and apparatus according to claim 1, wherein said array of light projecting devices comprising:

a spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus;

a lens array composed of plurality of elemental lenses, wherein the light that originates from focal points of individual lenses and passes through the spatial light modulator forms an autostereoscopic image, said lens array is placed, as viewed from the viewer's position, behind the spatial light modulator at a distance that may be smaller or greater than the focal distance of lenses in the lens array;

a backlight in a form of a non-diffuse light source placed behind the lens array as viewed from the viewer's position, said backlight projecting light onto the lens array, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array.

[c7] An autostereoscopic display method and apparatus according to claim 1, wherein said array of light projecting devices comprising:

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an aperture screen made of opaque material with plurality of apertures, wherein said apertures are transparent and do not significantly diffuse light;

a lens array composed of plurality of elemental converging lenses placed behind the aperture screen as viewed from the viewer's position, wherein points where the light is focused by individual lenses coincide with apertures of the aperture screen;

a spatial light modulator made out of material that does not diffuse light significantly, wherein said spatial light modulator displays a plurality of elemental images each of which is a projection of a three-dimensional scenery that is displayed by the whole apparatus, said spatial light modulator is placed in front of the lens array and either in front or behind the aperture screen as viewed from the viewer's position;

a backlight preferably but not necessarily in a form of a non-diffused light source placed behind the lens array as viewed from the viewer's position, said backlight projecting light onto the lens array, wherein said backlight is emanating light rays that have a predetermined direction, intensity and color at every point where they hit the lens array.

[c8] An autostereoscopic display apparatus according to any one of the claims 2, 4 and 6, wherein:

said lens array comprising a plurality of elemental lenses wherein at least one element of the lens array is behaving as a converging lens.

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[c9] An autostereoscopic display apparatus according to any one of the claims 2, 4 and 6,
wherein:

said lens array comprising a plurality of elemental lenses wherein at least one element of the
lens array is behaving as a diverging lens.

[c10] An autostereoscopic display apparatus according to any one of the claims 2 to 7,
wherein:

said lens array comprising a plurality of lenses at least one of which is a Fresnel lens.

[c11] An autostereoscopic display apparatus according to any one of the claims 2 to 7,
wherein:

said lens array comprising a plurality of lenses at least one of which is a diffraction lens.

[c12] An autostereoscopic display apparatus according to any one of the claims 4 to 7
wherein:

said backlight is a collimated light source.

[c13] An autostereoscopic display apparatus according to any one of the claims 4 to 7,
wherein:

said backlight is a point light source.

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[c14] An autostereoscopic display apparatus according to any one of the claims 4 to 7,

wherein:

said backlight is an array of point light sources, said point light sources are separated by opaque partitions arranged in such a way so that light from any two point light sources does not illuminate the same area on a backlit surface which is either the spatial light modulator or the lens array.

[c15] An autostereoscopic display apparatus according to any one of the claims 4 to 7

wherein:

said spatial light modulator is a liquid crystal display.

[c16] An autostereoscopic display apparatus according to the claim 1 wherein:

said array of light projecting devices is an array of liquid crystal display projectors.

[c17] An autostereoscopic display apparatus according to any one of the claims 2 to 3

wherein:

said image projector is a liquid crystal display projector.

[c18] An autostereoscopic display apparatus according to claim 1, wherein:

said array of light projecting devices uses color multiplexing to display an autostereoscopic image, which can be achieved either by devoting different light projecting devices to

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different basic colors or by making the same light projecting device radiate light of different basic colors over time switching between different colors with a high frequency, or by combination of these two techniques, said light projecting devices working in single color mode reproduce light distribution in intensity of single color from a three-dimensional scene displayed by the whole apparatus.

[e19] An autostereoscopic image capture and reproduction system similar to television capable of reproducing all four physiological depth perception cues as defined in the specification, said system comprising:

- a three-dimensional image capture apparatus for capturing information about a three-dimensional scene including directional distribution of light color and intensity at all points in some window in space for all directions within a certain field of view, wherein such apparatus could be any of the three-dimensional image capturing apparatuses described in the prior art;
- an autostereoscopic display apparatus according to any one of the claims 1 to 7;
- a transmission system for transmitting said information from said three-dimensional image capture apparatus to said autostereoscopic display.

[c20] An autostereoscopic image capture and reproduction system according to claim 19, wherein:

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said information is stored in some form during a transmission process for the purpose of recreating the three-dimensional scene at some later point in time by said autostereoscopic display apparatus.

[c21] An autostereoscopic image capture and reproduction system according to claim 19, wherein:

said information is transmitted by means of electromagnetic waves propagating in cables, waveguides or as airwaves.

[c22] An autostereoscopic display apparatus according to any one of the claims 1 to 7 wherein:

the outer surface of the display is not flat and may enclose some volume in space.

[c23] An autostereoscopic display apparatus that is composed of several autostereoscopic displays according to any one of the claims 1 to 7.

[c24] An autostereoscopic display apparatus according to claim 23 wherein:

said autostereoscopic display forms a surface that is not flat and may enclose some volume in space.